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A SOCIETY FOR THE ADVANCEMENT OF THE SCIENCE OF ELECTROPLATING

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CONVENTION DOPE

A few words from Montreal about our coming convention, June 29 to July 23, 1925:

"Well, John," said Frank, "what kept you so long getting this job done?" "Oh!" said the plater, "it didn't take me so long to do the job." "No?" said the Boss; "then what kept it so long getting here?" "Oh!" said the plater, "I was waiting for the other fellow."

About six weeks ago we sent out our call for what we felt were our first requirements. That was a call to our big friends who help to set the stage—for what is the stage without a setting? You might ask what are settings; well, I might say the settings for the first act are: The program and our wonderful display of all the things that go to make the art of plating a little easier to the man who has to do it or who is responsible for having it done.

Quite a few of our good friends have got their spaces, both in the program and exhibition hall; some only in the program. Some I have not heard from yet, but I feel sure they are just arranging things, and I will hear from them

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MONTHLY REVIEW

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PRESIDENT'S APRIL MESSAGE

Greetings to the Membership:

I take this opportunity to call your attention to the approaching Election of Officers, and ask that you use extreme caution in the selection of your candidates, that the stability of your Branch is not impaired by SPONTANEOUS selection of Members not QUALIFIED by the CONSTITUTION and the BY-LAWS, thereby incurring unpleasant relations for your BRANCH and the Supreme Society, whose duty is to you and the strict Maintenance of the Laws.

It is well on election night to have with you your copy of the Constitution and by-laws, and to remember that all ACTIVE members in good FINANCIAL standing can assume any Office in the giving of the SOCIETY subserviant to his POPULARITY. Therefore it should interest all the MEMBERS to be in attendance that NIGHT to meeting and see that only MEMBERS who have necessary qualifications to make OFFICERS are NOMINATED, and that will and can PERPETUATE the work of the SOCIETY and be LOYAL to the BRANCH of which they are MEMBERS, regardless of personal interests and CRITICISM. It is also well to remember that ASSOCIATE members can hold only the OFFICE of BOARD of MANAGERS as per ART. III, Sect. I, page 17 our Constitution, and it is well to carefully adhere to this LAW.

And upon the selection of your OFFICERS whose duties will impose SELF-SACRIFICE, and such MEN performing such service are worthy of the proper COMPENSATION, and the Branches should provide it with GENEROSITY, they deserve support and co-operation of the MEMBERS

who should readily and sincerely accord it by their PRESENCE at the MEETINGS and an interest in the work of the BRANCH. And they should be accorded COURTESY and CONSIDERATION and care should be taken to see that they get it in KINDLY words of COMMENDATION, that will create a desire within all the MEMBERS to serve rather than DODGE these DUTIES, to learn the REWARD of SERVICE to MANKIND.

As an Officer of our SOCIETY there are Compensations which come with every passing year, WISDOM and EXPERIENCE bring a truer conception of real VALUES and a greater capacity for that SERVICE, the acceptable performance of which is the chief aim of LIFE and which insures the deepest Satisfaction the HUMAN HEART can feel.

And if our BRANCHES are not being served by OFFICERS properly qualified they should be replaced and if the OFFICERS are not receiving the COURTESIES that they are entitled to the MEMBERS should be told their Definite PERSONAL responsibilities in this LAXITY.

Your assistance is especially asked in the establisment of New Branches during the year that we are about to start, that We may bring SUNSHINE to our brother Plater Foremen in cities that are not yet participating in our good works.

Last but not lease, Contests and Controversies over ELECTIONS to OFFICE or Matters of Policy are bound to occur in some BRANCHES, and if they are conducted with the true IDEALS and SPIRIT of the A. E. S. in MIND, good will result, and remember when a MATTER is once settled we should recognize the DEMOCRACY of our INSTITUTION, the MAJORITY prevails. Support our OFFICERS, avoid Petty Jealousies, Personal Animosity, and REMEMBER, We are a large family of BOYS seeking EDUCATION in the thing WE all love OUR ART and PROFESSION.

F. J. HANLON,

Supreme President, A. E. S.

CONVENTION DOPE

(Concluded from page two)

soon; and on account of that I feel that I can now write you a few lines to say that I think Montreal will have a good show and a big one. The leading actors for the play are now studying their papers and I want to tell you fellows that have not yet reported that you will have to hurry, for we hope to have our complete cast lined up before the end of this month. It would not be fair to give you a list now, or even a hint of who they are, no more than to say that if you intend preparing a paper to read, or to have read in case you should not be able to get here, why your name will be one of the Stars.

Now, no doubt quite a few of you who read this have never been in Montreal, and it is only fair to give you some little idea of where and what Montreal is. Montreal lies on the bank of the great St. Lawrence River and is midway between the Great Lakes and the Atlantic Ocean. It is the largest city in Canada, has very nearly a million people and has possibly features that cannot be found in any city in the United States of America. The visitor can see here the most up-to-date harbor on the American continent and also find in the outlying districts features dating back three centuries. Montreal is not so far away from so many of you, as it can be reached overnight from such places as New York, Boston, Buffalo, Detroit and the Connecticut Valley. Again, if you are coming by auto, it has a magnificent highway from New York with some of the greatest scenery that can be found anywhere. And then again, when you get here, you are going to find that the Mount Royal Hotel, where we are holding our Convention, is as fine a hotel as any of you could wish for, and the arrangements that they have made for us and the things they are willing to do to make our Convention a success could not be surpassed.

So we want you all to help. Don't forget this is your first Convention in Canada. Come one—come all. Don't let any stay at home and repent for years to come that they did not help to do their part to make this the most educational event of their lives.

NICKEL PLATING ON ZINC AND ZINC-BASE DIE CASTINGS[1]

By M. R. Thompson[2]

[1]Published by permission of the Director of the Bureau of Standards, Department of Commerce, Washington, D. C.

[2]Chemist, Bureau of Standards.

This paper includes the principles and the conclusions of a research on this subject at the Bureau of Standards. Further details of the experiments will be published in an article to be presented at the April, 1925, meeting of the American Electrochemical Society, which will be published in Volume 47 of their Transactions.

1. General Principles

The fact that the nickel plating of zinc and of die-castings containing 80 per cent. or more of zinc requires somewhat different conditions than the plating of brass or steel, is due to the greater tendency of the zinc to dissolve in the nickel solution. As is well known, if a piece of zinc is immersed in an ordinary nickel plating solution with no current flowing, it very quickly becomes coated with a black film. This film consists chiefly of metallic nickel that has been precipitated on the zinc in a finely divided spongy condition, by the zinc passing into solution and replacing the nickel. (In just the same way, when a piece of iron is hung in a copper sulphate solution, the iron dissolves and produces a deposit of copper "by immersion.")

The tendency for a metal to pass into solution, i. e., its "solution pressure," may be expressed in terms of the "Single potential" of that metal in the solution. Thus, it may be shown that zinc tends to dissolve in a nickel solution with a potential of about —0.8 V. The negative sign of this potential is in accordance with the present usage of most technical societies. When a metal, such as zinc, has a strongly negative single potential, this indicates that it has a higher solution pressure and a greater tendency to dissolve than does a metal such as copper, which has a positive single potential. In order to prevent the zinc from passing into solution and producing a spongy coating of nickel, to which the subsequent deposit will not adhere, it is necessary to apply to the zinc when it is hung in the nickel so-

lution, a potential at least equal to that which it tends to dissolve.

As explained in the papers from the Bureau of Standards on "throwing power," whenever a metal is deposited, the concentration of the metal and metal ions always decreases in the film of solution next to the cathode. This decrease in concentration is naturally greater with a high than with a low current density, as the metal is taken out more rapidly at the higher current density. In consequence it requires a more negative potential at the cathode to deposit metal at a high than at a low current density. The difference between this potential at the cathode and that when no current is flowing is known as the "cathode polarization."

Suppose that an effort is made to plate a piece of zinc in an ordinary nickel plating solution at a low current density. It will be observed that the zinc turns dark on some parts, forming black streaks, which indicates that, at the current density used on those parts of the cathode surface, the polarization is not sufficiently great to prevent the zinc from dissolving. If, however, as is customary in nickel plating on zinc, the current density is raised, a valve will be reached, at which no dark streaks are produced, which shows that then the cathode potential at all points is sufficiently negative to overcome the solution pressure of the zinc. It is comparatively easy to get from any nickel plating solution a good deposit of nickel on a flat sheet of zinc, on which the current distribution is nearly uniform, by sufficiently increasing the current density. For such purposes it is not unusual to apply, for a few minutes, a current density as high as 50 amperes per square foot,especially if the cathodes are moved.

If, however, the article to be plated is of irregular shape, as are most die castings and some objects made of sheet zinc, the current distribution will be far from uniform, and if the minimum current density required is 50 amp./sq. ft., that on some parts may be 100 or even 200 amp./sq. ft., and burnt deposits will be produced there. For such objects it is therefore desirable to employ a nickel solution in which the polarization is high, i. e., the required cathode po-

tential (in this case —0.8 V) will be reached at a low current density, and in which there will then be less tendency for the near parts of the object to receive an excessive current density.

In this investigation the polarization of various nickel solutions was systematically studied, in order to select those in which zinc can be satisfactorily plated at the lowest current densities.

On general principles it may be predicted that the nickel ion concentration in the cathode film during deposition may be decreased, and the polarization thereby increased by any of the following methods, all of which should therefore be beneficial for nickel plating on zinc:

1—Using a relatively dilute nickel solution.

2—Using a nickel salt such as the sulphate, which forms fewer nickel ions than the chloride.

3—Adding a salt with a common ion, e. g., sodium or magnesium sulphate, to a nickel sulphate solution.

4—Forming "complex ions," for example by the addition of organic salts such as sodium citrate.

5—By increasing the current density.

6—By cooling the solution.

7—By decreasing the "convection" of the solution (which is upward in still plating) along the face of the cathode, which movement tends to bring up fresh portions of the nickel solution. Convection may be hindered by (a) increasing the viscosity of the solution, (b) increasing the specific gravity of the solution, and (c) avoiding mechanical stirring.

8—By the addition of colloids which "migrate" to the cathode and thus increase the polarization.

Among these possible methods, Nos. 4 and 5 have been most extensively applied in commercial practice, that is the addition of sodium citrate to the solution, or the application of a high current density in an ordinary solution. In many cases magnesium sulphate has been added to the solution in moderate amounts. (No. 3). The results of this study showed that sodium citrate has the greatest beneficial effect upon the polarization of any of the substances commonly used. If polarization were the only considera-

tion, there would be no advantage in suggesting substitutes for sodium citrate. Actually, however, the sodium citrate solutions have certain disadvantages, such as relatively low throwing power and cathode efficiency, high cost, a ten dency toward decomposition, and difficulty of control by analysis.

The most promising means of improvement appeared to be No. 3, i. e., the addition of some other sulphate in the highest possible concentration. Sodium and magnesium sulphates are the only common sulphates that can be used in high concentration in nickel solutions on account of solubility relations. Experiments showed that by adding a large amount of either of these salts a high polarization is produced and zinc can be plated at a relatively low current density from such solutions. Part of the increase in polarization is due to the fact that the addition of sulphates increases the density and viscosity of the solution and thus hinders convection (No. 7). In general, nickel deposited at a relatively high polarization from this or any other type of solution is likely to be bright and hard.

In addition to this fundamental advantage of high polarization, the solutions with a high content of sodium or magnesium sulphate have very high conductivity and throwing power, they are easy to analyze and control, they do not readily decompose, and they are cheap. Either salt may be used, but the sodium sulphate produces the best conductivity and throwing power. Experiments in the laboratory and in commercial plants have shown that these "high-sulphate" solutions are well adapted for plating on zinc and zinc-base die castings. In addition they are suitable for barrel plating of brass and steel, for which purpose the high conductivity and throwing power of the solutions, and the bright luster of the deposits are especially advantageous. Any novelty in the recommendation of such solutions depends not upon the mere presence of the sodium or magnesium sulphate, which salts have been frequently used in nickel plating baths, but upon the relatively high concentration in which they are employed.

More extensive experience will be required to define the best conditions for applying this type of solution to each

particular class of work. The following general range of conditions is suggested:

1—Composition of Solution:

	N	g/L	oz/gal
Nickel sulphate, $NiSO_4 . 7H_2O$ (single salt)	0.5 to 1.0	70-140	9-19
Boric acid, H_3BO_3	0.25 (M)	16	2.1
Ammonium chloride, NH_4Cl	0.25	13	1.7
Sodium sulphate (anhydrous[1]), Na_2SO_4	1.5 to 3.0	107-213	14.28

[1]Sodium sulphate may be obtained commercially either as the dry powder (Na_2SO_4) or as the crystallized salt, known as "Glauber's Salt," ($Na_2SO_4 . 10H_2O$). The former will usually be the more convenient to purchase on account of the saving in bulk and freight. If the crystallized salt is employed it is necessary to use 2.27 times as much as of the anhydrous salt. A fairly high grade of commercial sodium sulphate should be used, which does not contain excessive amounts of iron or of free acid or alkali, such as may be present in the lower grades of sodium sulphate.

The solution with 3 N sodium sulphate, which contains 28 oz/gal of the anhydrous salt, or 64 oz/gal of the crystallized Glauber's salt, is nearly saturated at ordinary temperature, and if the solution cools, some sodium sulphate will crystallize out. Unless therefore the solutions are kept at a temperature above 60°F (15°C), it will not be possible to retain this maximum content of sodium sulphate in solution. As, however, the polarization, conductivity, and throwing power are all increased as the sodium sulphate content is increased, the latter should be kept as high as practicable under any existing conditions, in order to secure the maximum benefit from this type of bath.

2—Conditions for Zinc and Die Castings:

It is no more difficult to plate die castings than pure zinc if similar shapes are used. The greater difficulty often experienced in plating die castings is due to the fact that they are usually of very irregular shape. The following conditions are suggested for both zinc and die castings:

(a) A minimum average **cathode current density** from 15 to 20 amp./sq. ft (1.5 to 2.0 amp./dm^2) on simple shapes, and up to 35 amp./sq. ft. (4.0 amp./dm^2) on complicated shapes.

(b) The bath **voltage** will usually be between 2 and 4 V. Owing to the higher conductivity of the solution it is not necessary to use as high a voltage to produce a given current density as in ordinary nickel solutions. **Unless the current density is controlled, burnt deposits may be produced.**

(c) The **anode current density** should be kept below 20 amp./sq. ft. (2amp./dm^2) by the use of a large area of clean anodes, preferably the 95-97 per cent. cast anodes.

(d) The **pH** should be kept between 5.5 and 5.8.

(e) Moderate **movement** of the cathodes, as on moving rods, prevents burning on points of highest current density.

3—**Conditions for Barrel Plating Steel and Brass.** The lower suggested concentration of about 1.5 **N** sodium sulphate (14 oz/gal of Na_2SO_4 or 32 oz/gal of $Na_2SO_4.10H_2O$) has the advantage that the solution is less viscous, and hence there is less mechanical loss of solution when the work is removed. It is hard to define the current density in barrel plating owing to the irregular shapes and variable current distribution. In some cases the regular voltage for barrel plating (e. g. 6 to 8 V) has been applied, and owing to the greater conductivity the plating has been completed in a shorter time.

The use of a concentrated salt solution of high conductivity is likely to be new in the experience of most platers, and for specific purposes modifications may be required. In order to assist in such adjustments the Bureau of Standards will be glad to learn of the experiences of platers with this type of solution.

The author is indebted to William Blum and H. E. Haring for advice and assistance, and to the Doehler Die Casting Company, C. Pack, R. L. Shepard, A. B. Schupp, Wm. Delage, H. M. Johnquest and the members of the Research Committee of the Electroplaters' Society for information and materials required in this investigation.

THE AMPHOTERIC CHARACTER OF GELATINE AND ITS BEARING ON CERTAIN ELECTRO-CHEMICAL PHENOMENA

Summary of Paper by Per K. Frolich[1]

[1]The original paper was presented to the American Electrochemical Society at the meeting in Detroit on October 3, 1924, and will appear in Volume 45 of their Transactions.

This paper is of interest to electroplaters, because it offers a rational explanation of the behavior of such colloidal substances as gelatine (or glue), which are often used as addition agents in plating baths.

Gelatine, albumen, casein, etc., belong to the group of organic substances which are called proteins. These are compounds containing carbon, hydrogen, oxygen, nitrogen and sulphur, which are so complex that their exact chemical constitution has never been established, though much progress has been made in recent years. It is now recognized that under certain conditions gelatin acts like a base, i. e., it has the power to combine with an acid to form a salt such as gelatine chloride. Under other conditions, however, it acts like an acid, e. g., when it combines with sodium hydroxide to form a salt which may be called sodium gelatinate.

A substance which has the power to act like a base or an acid, according to conditions, is said to be "amphoteric." It is not possible for such a substance to act as a base and an acid at the same time. If, therefore, it is introduced into a solution which is neither sufficiently acid nor alkaline to combine with it, it will remain in an uncombined form. For gelatine the "neutral" or uncombined condition exists when the pH of the solution is 4.7, which is called the "isoelectric point" of gelatine.

If the gelatine acts as a base, e. g., in gelatine chloride, it forms gelatine "cations," which during electrolysis move toward the cathode, just as do the ions of metals and hydrogen. If, on the other hand, the gelatine exists as sodium gelatinate, it forms gelatine "anions," which move toward the anode during electrolysis. Whether therefore the gelatine in any solution will pass toward the anode or the cathode will depend upon the pH of the solution. If the pH

of the solution is less than 4.7 (i. e., more acid) it migrates toward the cathode; if the pH is above 4.7 (more alkaline), toward the anode. At pH 4.7 it does not move toward either electrode.

In order to produce a **direct** effect upon the deposited metal, the gelatine must migrate toward the cathode. In alkaline solutions, such as the cyanide plating baths, gelatine is not therefore directly effective as an addition agent. In acid copper baths, however, in which gelatine is frequently used as an addition agent (e. g., in copper refining), the gelatine moves toward the cathode. It has been frequently observed that the "cathode polarization" is greater when gelatine is present, i. e., it requires a higher potential at the cathode to deposit the metal at any given current density. (Frequently, but erroneously, the increased voltage required when gelatine is present is attributed to a decrease in conductivity, though it is due almost entirely to the increase in polarization.)

The well-known observation that copper deposited from sulphate solutions containing gelatine is more fine grained than the usual copper deposit is due to the fact that the gelatine in the solution has migrated toward and accumulated at the cathode surface, and has there hindered the natural processes of circulation, which normally bring up fresh solution and thus replenish the metal content of the solution at the cathode surface. Therefore, when gelatine is present, the metal is actually deposited from a more dilute solution, which requires a higher potential, which in turn produces finer grained deposits.

In this process it is believed that the gelatine film formed near the cathode surface has a sponge-like structure, in the pores of which copper may, under certain conditions, be deposited. Hence some of the gelatin may be included in the deposit, although such inclusion is not the cause of or essential to the formation of fine-grained deposits.

In zinc sulphate baths it is customary to have fairly acid solutions, with e. g., a pH as low as 2.5. In such solutions we would therefore expect gelatine to move toward the cathode, increase the polarization, and produce finer grained deposits. Such effects are actually observed. Con-

ditions at the cathode are, however, slightly different from those in a copper bath, owing to the fact that in zinc and nickel sulphate solutions the film at the cathode is always more alkaline (higher pH) than the body of the solution, while in copper solutions it is more acid. Thus it was found that in zinc sulphate baths the pH of the cathode film is about 6.2, even when that of the body of solution is as low as 2.5. Hence, even though the gelatine moves toward the cathode, there is no tendency for it to accumulate upon the actual cathode surface, and it is less likely to be included in the deposited zinc. This explanation is confirmed by the fact that gelatine in zinc solutions has a marked effect on the structure of the deposits, even when no gelatine or other organic matter can be detected in the deposited zinc.

In nicked baths, the pH of the main solution is almost always above 4.7, and that of the cathode film is usually much higher. Hence, we would not expect any **direct** effect of gelatine upon the structure of nickel deposits. Actually, however, it has been found to change the structure and properties of the nickel deposit. When these nickel deposits are dissolved they leave black residues containing carbon. As in other experiments similar residues were obtained from nickel deposited from solutions containing no gelatine, but into which gases, such as illuminating gas and acetylene were bubbled, the author concludes that the effect of gelatine upon nickel deposition is due to the decomposition of the gelatine to form gases, which are then taken up in some form by the deposited nickel.

This paper therefore shows that the different effects of gelatine in the usual sulphate plating solutions of copper, zince and nickel are due to the acidity conditions in these baths. In copper solutions the gelatine migrates to the actual cathode surface, and may therefore be included in the deposit. In zinc solutions it migrates **toward** the cathode and affects the polarization, but does not reach the cathode surface, and hence is usually not included. In nickel solutions it neither migrates to nor is included by the cathode, though the gaseous products of its decomposition may be taken up by the nickel and thus affect its properties.

The author realizes that his explanation is general, and that detailed studies will be require dto explain specific effects. The principles discussed in this paper should be very helpful in such researches.

Abstracted by W. BLUM.

SUCCESSFUL METHODS OF PLATING DIE CASTINGS OF ALUMINUM COMPOSITION AND SHEET ALUMINUM

By Jacob Hay of Chicago Branch
C. M. Hall Lamp Comapny, Kenosha, Wis.

On several occasions I have been asked by the members of our Society to write a paper covering my experience on plating Die Castings. It is true that I have had considerable experience in this line of work; and have had a certain degree of success.

We all agree that die castings give us more food for thought than any other class of work we are called upon to handle. This is due to several reasons. Die castings are are made from many different mixtures of metals. The castings are called upon to perform various functions wherein strength and lightness etc., must be taken into account. This affects the mixtures of which the castings are made, and wherein the plater finds his many troubles.

The greatest trouble I have had in work of plating die castings has been caused by what I call "pin holes"; when the castings are submerged in the solution a little air pocket forms not permitting the solution to leave a deposit of nickel, but instead seems to enlarge the hole and form a crater. This may be caused of course by a small hole in the castings and also by the nature of the metal itself, which is more or less greasy.

After receiving the castings from the Buffing Department, where they have been cut down, they are soaked and scrubbed in gasoline, carbon tetra chloride and kerosene. They are then returned to the Buffing Deaprtment and colored, a dry white diamond composition being used giving a high dry luster. In the coloring operation great care must

be taken that no buffing dirt is left on this casting. The following cleaner is used before plating:

Caustic Soda	2 Ounces
Tri-Sodium Phosphate	4 Ounces
Carbonate of Soda	3 Ounces
Water	1 gallon

It wil lonly be necessary to add caustic soda to this cleaner after cleaner is once made up. In using this cleaner, proceed as follows: Dip castings in cleaner three seconds, or until the metal is acted upon, then rinse in cold water, back to cleaner for a second and then rinse in cold water, this being done, immerse in the following Dip for three seconds.

Nitric Acid	2 gallon
Sulphuric Acid	1 gallon
Iron Chloride	2 ounces

After this is done, rinse thoroughly in cold water.

The castings are then ready for Plating solution, which is made up as follows:

Nickel Sulphate and Ammonia	8 ounces
Nickel Sulphate	12 ounces
Nickel Chloride	4 ounces
Boric Acid	4 ounces

Hydrofluoric Acid is added to keep nickel solution point to four to five P. H. The solution should be tested every day for acid by the Standard Drop Ratio Method.

I attribute my success in handling Die Castings to the careful attention I give to my solutions. The acid dip must be kept up to strength. You cannot be too careful, and all succeeding operations must be followed with clock-like precision. It is only by so doing that one may be successful in this line of work.

The most important factor of all is that the nickel solution should never be allowed to become neutral or alkaline. The metal content should be kept at 2½ ounces (a little more will do no harm, but never less). The acid content should be kept at four to five P. H. and never below.

By using the formulas described and by giving careful attention to the solutions, castings will be produced with a very good coat of nickel of soft structure and a very high lustre.

While I have not gone into the subject at much length, I think I have explained the more difficult angles—but if there are any questions at this time or at your convenience, I would be more than pleased to be at your service.

G. A. Barrow, Cleveland Branch
Jackson Steel Prod. Ct., General Motors Corporation, Jackson, Mich.

The qualities possessed in expression of one's thoughts are valuable assets. I, for one, do not possess these qualities, but I am going to make an attempt at writing which, if successful, hope I will have about 90% of our readers in MONTHLY REVIEW on my side; for in reading over this issue from month to month, only about 10% of the membership are in possession of qualities of expression. Now, is this true, or is it the fear of criticism that fail to bring out an expression, through our REVIEW, from most of us?

It may be that we feel that our powers of scientific expression will not be written in the proper technical language, but our REVIEW is for expression of thought, no matter how you get it across, for the simplest words sometimes draw the prettiest picture, quoting our old friend, Mr. Dady Hale of Akron, Ohio, 1917 convention, St. Louis—"H_2O may be all right, but a bucket of water is a bucket of water."

So we do not want to misunderstand each other in our sincerity of thought. The thought is worked out and put into pratcice, which, if a good one, equals results, and it is the results that count, and that is what we are interested in; the final summing up, and from the men I have met in the A. E. S. I will vouch that they are interested in the same thing. No matter if our record is in our own language, or our records of compilations of scientific research be in technical language, if so, there are scientists always available for the purpose, who can do it, magnificently, for our own little REVIEW does not claim to be a scientific publication, but one "For the Advancement of the Science of Electroplating."

So, after reading our President's message, I have resolved to write and in my own style, for I, too, have had that fear, but just go ahead and criticise, and you'll all start something, for I am resolved to write and protect my theories until I have been shown that they are otherwise wrong.

BRANCH NEWS

Dayton Branch

Regular monthly meeting of the Dayton Branch, A. E. S., was held in the Y. M. C. A. Laboratory, April 4, with President Harter presiding. Minutes of the preceding meeting were approved as read.

Mr. Van Deran gave a very interesting talk on the "Control of a Cyanide Copper Solution."

We regret to announce the death of our member, Mr. M. S. Wad, who died very suddenly of pneumonia, March 9.

The communication from the tCleveland Branch on the Resolution for Amendment of Constitution was read and discussed.

The meeting was then turned over to Mr. Suman, who instructed a large class in the use of the comparatory block, with all the members taking a very interesting part.

Waterbury Branch

At the meeting of Waterbury Branch, March 27, the members were entertained by Mr. L. E. Miller of the Oakite Chemical Company, who gave an interesting talk on his trip up the River of Doubt with the late Col. Roosevelt. Mr. Miller's lecture, which was illustrated, proved to be very instructive and was greatly enjoyed by all present.

While the meeting held April 10 (Good Friday) was not as largely attended as some of the previous ones, yet those who were present enjoyed some lively discussions on matters brought up for an expression of their opinions. The amendment to the constitution drawn up by the Cleveland Branch relative to the classes of membership in the A. E. S., and which will be presented to the coming convention at Montreal for action, was read and views concerning same were exchanged. There were those present who thought that Cleveland did not have a monopoly of the kind of salesmen complained of. Others thought that the salesmen, the same as other human beings, had to exist, and probably thought they were acting in a legitimate manner, not giving a thought to the platers' welfare. The opinion was also expressed that the newly formed salesmen's organization might be able to control or eliminate this so-called evil to some extent. Further action on the subject will be taken up at a later meeting.

St. Louis Branch

H. H. Williams, secretary and treasurer of the St. Louis Branch, A. E. S., was given a surprise visit at his home on the evening of March 11 by his fellow members.

Mr. Williams, who has been confined to his home the greater part of the past four months with sciatic rheumatism, has been missed at our Branch meetings so much that the boys decided to bring the meeting to their beloved friend.

He has received numerous visits, flowers, books and even a quantity of magnesium sulphate from different members of the Branch, and he appreciated them, but when over half of the local membership came in

a body and brought along a beautiful mahogany roll-top desk, and in presenting it told him it was but a slight token of their love and appreciation of his untiring efforts in behalf of the St. Louis Branch, A. E. S., he was surely surprised.

In his usual characteristic, deliberate and calm manner he told the boys how much he really appreciated their visit and their beautiful gift and that he would be glad to continue to help them and the A. E. S. whenever he could.

We are pleased to report that Mr. Williams is gradually getting back to normal again, and in the near future expects to be back in his busy plating and polishing departments.

Hartford-Connecticut Valley Branch

Hartford-Connecticut Valley Branch met on Monday, March 23, at the Hartford Engineer's Club. Three applications for membership were presented and one resignation received.

Vice-President Kennedy was elected presidnt to fill the vacancy caused by the resignation of George B. Hogaboom. Mr. A. P. Munning, 2nd, was then introduced and he gave an extremely interesting and instructive talk on "Metal Cleaners," one of the best that we have heard for some time.

Toronto Branch

The members who were present at our March meeting were fortunate. Those who were absent for no good reason missed an exceptionally instructive and interesting talk on "Brass, Its Structure and Physical Properties," given by Prof. O. W. Ellis, professor of metallurgy, University of Toronto. Prof. Ellis was in charge of the ordinance factory at Woolrich, England, during the great war, and is an authority on metals and a trained lecturer as well. The lecture was splendidly illustrated by stereopticon views and the subject was made plain and actually fascinating by the professor. We were told of the freezing temperature of brass, the temperature at which solidification of molten brass begins. How different brasses varied in hardness, tensile strength and elongation. Thirty per cent. zinc makes most ductile brass. When the metal is deformed large crystals are broken up into smaller crystals. We were told how the Brinnell hardness test is used, and of annealing temperatures. Smaller the little crystals the harder the brass. The relation of grain size to hardness of brass was described, effect of annealing temperature on Muutz Metal. To obtain uniform machining condition of brasses, anneal all castings at some definite temperature. Differences in structure of brasses may result from varyig temperature treatment and cooling. We were shown the effect of annealing on hardness of quenched 60-40 brass. Stresses and the results are usually caused by some omission of care in manufacturing. We were shown specimens of extrusion faults, season cracking and expansion and contraction results. They were exceedingly interesting. To test brass tubing to possibility of season cracking use Mercuric Chloride or Murcurous Nitrate on the brass. If season crack-

ing does not occur in a few hours the brass will not cause trouble from this source. If season cracking is indicated it may be prevented by heating the brass to 400 degrees centegrade. Season cracking is due to stresses or deformation during manufacture. Brown streaks on copper, such as remain after usual treatment preliminary to electroplating. Brass castings made from coarse-grained zinc may be finished with better polished surface than brass castings made from fine-grained zinc, because coarse-grained zinc is purer than fine-grained zinc. Large spangle on galvanized iron (molten process) usually indicates purer zinc coating than when smaller spangle is formed. Small spangle due to rate of cooling or impurities, poor grade, small grain. The discussion following the lecture was spendid and we all hope Prof. Ellis will consent to address us again.

Question Box—Does soft iron take on a better color when plated than hard iron?

Answer—Ordinarily no, hard iron burnt in polishing will not color well after nickeling. Free carbon on surface of hard steel, due to excessive acid treatment, will cause difficulty in coloring nickel coating.

Question—Does mineral wool, which is placed around ovens of electric stoves, have anything to do with ovens rusting?

Answer—If mineral wool contained sulphur or was placed in spaces around oven while damp, rust might result. Ovens coated with vitrified enamel will resist the moisture and eliminate the trouble.

Question—Should I give castings used for electric stoves a heavier coat of nickel than for other stoves?

Answer—No reason for heavier coating was given; good, durable deposit advisable on all stove castings.

Question—If bumper bars 5 feet long are plated in a tank 4 feet long will the end which is in the air oxidize while the other end is plating?

Answer—It certainly will.

Philadelphia Branch

President George Gehling presided at the April meeting of Philadelphia Branch.

Mr. A. K. Graham continued his lecture on "Nickel Solution," demonstrating the various indicators used.

The Stay-at-homes are missing some very good things. Let us have every member present at the May meeting as an important subject will be brought forth that will interest you.

Mr. S .T. Lumbeck showed a rubber covered plating rack and recommended its use as you get a better contact and efficiency.

Cleveland Branch

The Cleveland Branch met on April 4 at the Hotel Winton. The meeting was called to order by Pres. Scott at 8:00 P. M. The minutes of the previous meeting was read and approved as read. Letter from the Cleveland Chamber of Commerce ordered placed on file. A paper by G. A. Barrows was read and approved to be printed in the Monthly

Review. There was a lively discussion on our new amendment and the future of the A. E. S. Paul R. Stamm and C. E. Marker took the obligation. The application of Albert Schultze was turned over to the Board of Managers again for further investigation. George J. Weigand of the Providence R. I. Branch was a visitor and made a very nice little speech (thanking you George, come again) and hope to have a great many more visitors this summer. Every member is more than welcome. There being no further buisness, adjournment was called for at 10:30 p. m.

Indianapolis Branch

Indianapolis Branch held its regular meeting April 11th, with a fair attendance. In the past Indianapolis meetings lacked educational features which of course caused lack of interest but I believe we are getting out of that rut now. Mr. William Lamoureux (Indianapolis member) presented and read a paper on Self-Sustaining Nickel Solutions, which seemed to hit the spot and brought out some lively discussions . The paper will be forwarded to The Reveiw for publication. The Librarian also has the promise of two subjects for next meeting.

Cincinnati Branch

The Cincinnati Branch are a busy bunch every Thursday night at the Industrial Training Quarter at Spring and Liberty streets. Drop in and see us when in Cincinnati on above date and pay us a visit, every A. E. S. welcome.

Milwaukee Branch

The 138th regular business meeting of the Milwaukee Branch was held April 9th at Lipps Hall, Third and Prairie Streets. The following members were nominated for office for the coming year:

President, R. M. Goodsell; Vice President, Ed. Werner; Sec. and Treas., R .G. Hunt; Librarian, F. Marx; Asst. Librarian, M. Nishwitz. Board of Managers—R. Steuernagel, D. Wittig, A. Bronn, C. A. Crumpton. Delegates to Convention—R. M. Goodsell, R. Steuernagel, M. Bilicki. Alternates—D. Wittig, E. C. Yaeger, F. Kakatsch.

The Milwaukee Branch will hold a dinner dance on May 2.

At our last educational meeting "brass plating" was the subject for discussion. Mr. Ray Goodsell reported very good results from the use of rochelle salts in brass solutions. He finds that by its use that anode crosion is better and that the anodes remain clean.

Brass Plating will be our subject for our next educational meeting.

Pittsburg Branch

At our regular meeting held Saturday evening, April 4th., our committee arranging for our annual Dinner Party and entertainment, reported that all plans had been made, and that a first class dinner and entertainment will be provided free to all members, their families and friends. This seemed to be good news to those present, if you were to

judge by the discussion that followed.

We are expecting every member present at our dinner party and trust that all will feel well paid for the evening.

Chicago Branch

Rgular monthly meeting of Chicago Branch, A. E. S., held April 11, 1925 at Atlantic Hotel.

Meeting called to order with President F. J. Hanlon presiding and a very good attendance.

We regret to receive the resignation of our Vice-President, Mr. James Emmette, who now resides in California.

Mr. Jacob Hay was unanimously elected Vice-President.

Convention Booster Committee reports reservations coming along very fast.

Subject for the Eve was Pitting and proved very interesting from the way the members took part.

Question Box

Question 1—How much gold per inch of surface on musical instrument to wear five years?

How fast will gold deposit per ampere hour solution at 140 Far. 7Dwt gold per gallon, free cyanide one ounce per gallon, phosphate 1 ounce per gallon?

Answer 1—This question was not answered, but a method used by musical manufacturing was given. Instruments are plated with silver weighed and are plated with one Troy ounce of gold.

Question 2—Will a double nickel solution pitt as readily as a single solution?

Answer 2—Yes, with an excess of voltage or acid .

Question 3—What causes voltage to raise after rheostat has been set in a silver solution?

Answer 3—Lack of cyanide anodes coating over was given as reason.

Question 4—What is the proper amount of silver in silver solution for throwing in deep recesses? What should cyanide content be?

Answer 4—Our member stated that for flat work solution be high in metal and low in cyanide while for work with deep recesses solution should be low in metal and higher in cyanide.

There was some very interesting methods given by members present, how they control solutions for their work.

St. Louis Branch

Regular meeting held on April 7. The attendance was below average, possibly on account of it being election day. Secretary Williams was again on the job after a long absence, although not entirely recovered, he is at work each day. His address after May 1 will be 5041 Bancroft avenue, St. Louis.

The most important items of business were those concerning Montreal convention. E. J. Musick is right after the boys for papers, ex-

hibits and "get there." A letter from E. W. Heil says it is not too far for him from Wichita, Kansas.

We believe that St. Louis Branch will be well represented, although some are slow in signing up. To date "Ed" has five or six.

Our librarian, Mr. Frank Horath, was absent for first time since in office. He has had trouble with his eyes and will have had an operation to correct condition before this is in print. Frank is indeed loyal to his branch, and our best wishes are for and with him.

Bridgeport Branch

The regular April meeting was held on the 3d, with a fair attendance, President Wm. Flaherty presiding.

The Banquet Committee reported that they had a splendid educational program arranged.

A letter from the Montreal Branch asking if any of the members of this branch intended to read papers at the coming convention.

An amendment of the constitution from the Cleveland, Ohio, Branch was read and a committee of three (3) active members, consisting of Wm. Stratton and N. Barnard and Wm. Thompson, was appointed to express the opinion of this branch on the subject.

A letter was read from the Bridgeport Public Library asking us if it was possible to have a copy of the REVIEW each month for their files, advising us that they have a number of inquiries for it. According to the rules of the society we cannot comply with this request. There was quite a discussion on this issue, most of the members being of the opinion that it would be in keeping with the educational aims of our society to give out any information that was of an educational nature. We would like to hear from some of the other branches on this.

ELECTED TO MEMBERSHIP

New York Branch

Hy. T. Kiefer, active .....83 Hancock St., Jersey City, N. J.

Milwaukee Branch

Mr. Harold M. Cherry, assoc. .....1008-45th Street, Milwaukee

Cincinnati Branch

Joseph J. Tressel, Active .....211 Edwards Bldg., Cincinnati, Ohio

Montreal Branch

John T. Reisenberg, Active .....807 Marguelle St., Montreal, Canada
Eugene Feeley, Active .....Lome St., Montreal, Canada

RESIGNED

Hartford-Connecticut Valley Branch

George Cartlidge .....72 Washington Circle, West Hartford, Conn.

APPLICATION FOR MEMBERSHIP

Pittsburgh Branch

Chas. B. McClaskey, associate .....R. & H. Chemical Co.

Philadelphia Branch

Carlton Smith, active .....Hatboro, Pa.

St. Louis Branch

Jos. Zinselmeir .....103-8th St., St. Louis, Mo.

Hartford-Connecticut Branch

Thomas F. Kennedy, Active .....88 Mathes St., Hartford, Conn.
Matthew F. Flaven, Active .....14 Columbia St. Hartford, Conn.
F .C. Williams, Jr., Assoc. .....C|O Textile Mfg. Co. Westfield, Mass.

Cleveland Branch

Albert Schultz

Chicago Branch

Walter H. Donnelly .....66 Melrose St., Chicago, Ill.
Lawrence C. Mertz
c|o Deversey Mfg. Co., 536 Lake Shore Drive, Chicago, Ill.
L. P. Chapman .....339 W. Washington St., Jackson, Mich.

OBITUARY

Dayton Branch reports the death of Mr. M. S. Wade, 1621 Suman Ave., Dayton, Ohio.

Montreal reports the loss by death of Andre Giroux on April 9.